Innovative Partnership Program (IPP)

Success Story

Huff & Huff, Inc. Licenses NASA EZVI Technology

Partnership

On December 29, 2004, the NASA Kennedy Space Center (KSC) Technology Transfer Office successfully completed the negotiation and signing of a Nonexclusive Patent License Agreement with Huff & Huff, Inc. for the use and sale of NASA's Emulsified Zero Valent Iron (EZVI) (U.S. Patent No.6,664,298) technology for groundwater remediation. Huff & Huff, Inc., is a small-business, environmental and groundwater remediation services company with commercialized specialty products for groundwater remediation.

Kathy Brooks and Dr. Jackie Quinn train Huff & Huff, Inc. Vice President Jim Huff how to make EZVI Emulsion

Commercial Benefits

Beginning in the 1950s and 1960s, an abundance of effort and initiative was focused on propelling the space industry outward for planetary exploration and habitation. During these early years, the push to take space science to new levels indirectly contributed to the evolution of other fields of science. One such field, environmental remediation, is associated with the cleanup of environmental resources such as groundwater, soil, and sediment.

The space-exploration initiative began prior to the establishment of the U.S. Environmental Protection Agency (EPA) in December of 1970. Therefore, many NASA Centers and space-related support contractors allowed for the release of spent chemicals, including solvents classified as dense non-aqueous phase liquids (DNAPLs), into the environment. Subsequently, these land owners have been directed by the EPA to responsibly initiate cleanup of their impacted sites. The EPA has reported that DNAPLs are present at 60% to 70% of all sites on the Superfund National Priorities List- a list of national priorities among the known releases or threatened releases of hazardous substances, pollutants, or contaminants throughout the United States. These sites include dye and paint manufacturers, dry cleaners, chemical manufacturers, metal cleaning and degreasing facilities, leather tanning facilities, pharmaceutical manufacturers, and adhesive and aerosol manufacturers.

Few technologies exist that can treat DNAPLs in a timely and cost-effective manner. NASA's EZVI technology overcomes these limitations by providing a method that is quick, effective, and cost-competitive. EZVI involves placing nano-scale zero-valent iron particles into a surfactant-stabilized, biodegradable water-in-oil emulsion. This emulsion is injected into the DNAPL-contaminated zones of the subsurface. The DNAPL is then pulled into the emulsion where the contaminant reacts with the zero-valent iron. Through a combination of chemical and biological reductive dehalogenation processes, the DNAPL and its daughter products are degraded into ethene and chlorides, which do not pose an environmental threat.

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Value Back to NASA

During the early history of the space program, areas of Launch Complex 34 at Kennedy Space Center were polluted with solvents used to clean Apollo rocket parts. The solvents are classified as dense non-aqueous phase liquids (DNAPLs). Left untreated in the ground, DNAPLs are able to contaminate fresh water sources. DNAPLs are a common cause of environmental contamination at thousands of DOE, DOD, NASA, and private industry facilities. EZVI technology can be used to help remediate these sites in a timely and cost efficient manner.

Huff & Huff, Inc. Biography

Huff & Huff, Inc. is a 25 person environmental consulting firm located in LaGrange, Illinois. The firm graduated from the federal Disadvantaged Business Enterprise program in 2001; but remains a Women's Business Enterprise company for local and state-funded projects. Approximately 70% of the firm's market is in the private sector, with remediation being the largest part of the environmental work. The firm is currently remediating a perchloroethylene (PCE) site in Ohio, that had a release of over 15,000 pounds of PCE into the environment. This was the first site in Ohio that has an approved Record of Decision recognizing intrinsic bioremediation as part of the remedy.

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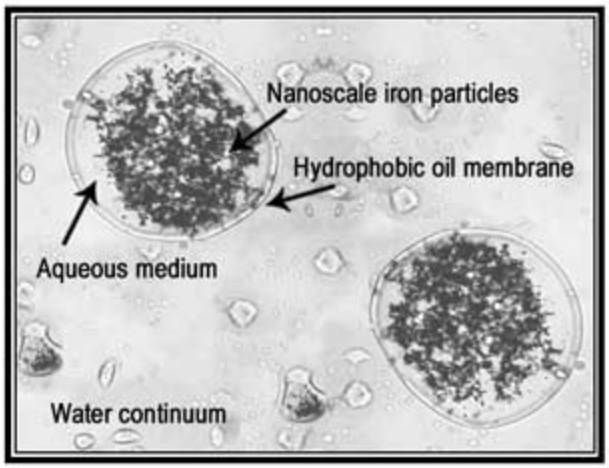

Micrograph of an EZVI emulsion droplet.